Connection and Programming Manual for JXECU08 controller

1. Set-up

1.1. JXECU08 connection diagram

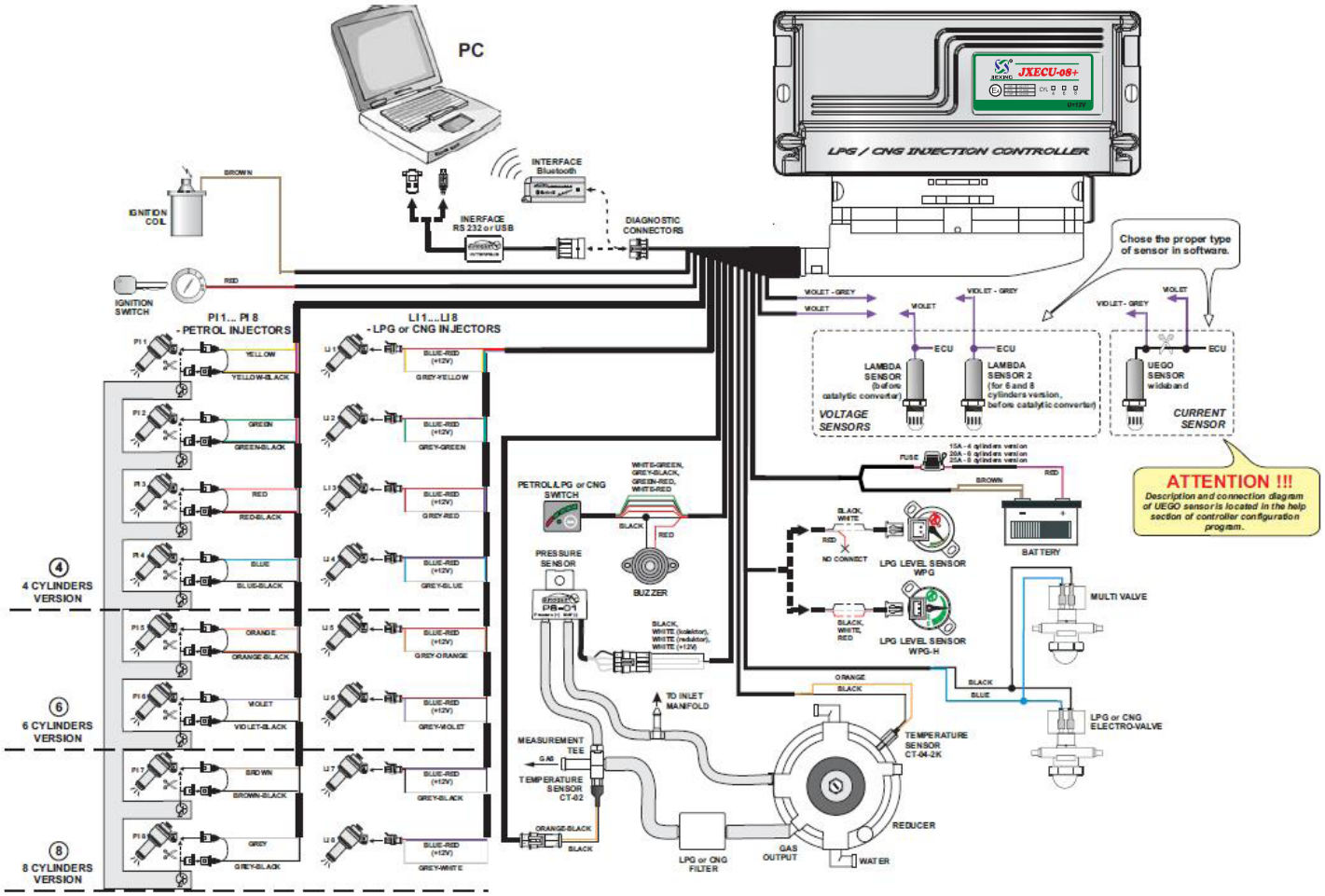
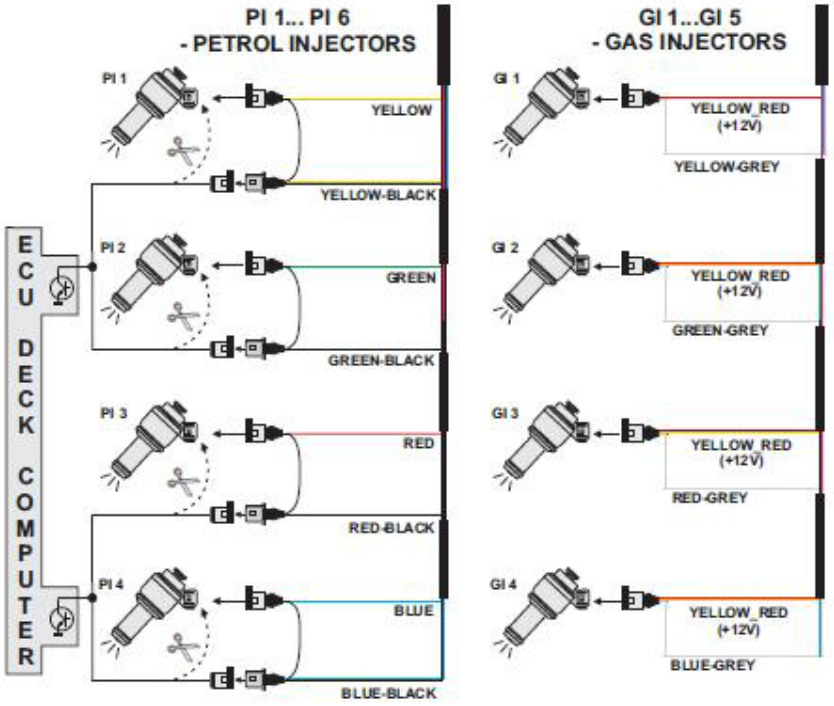
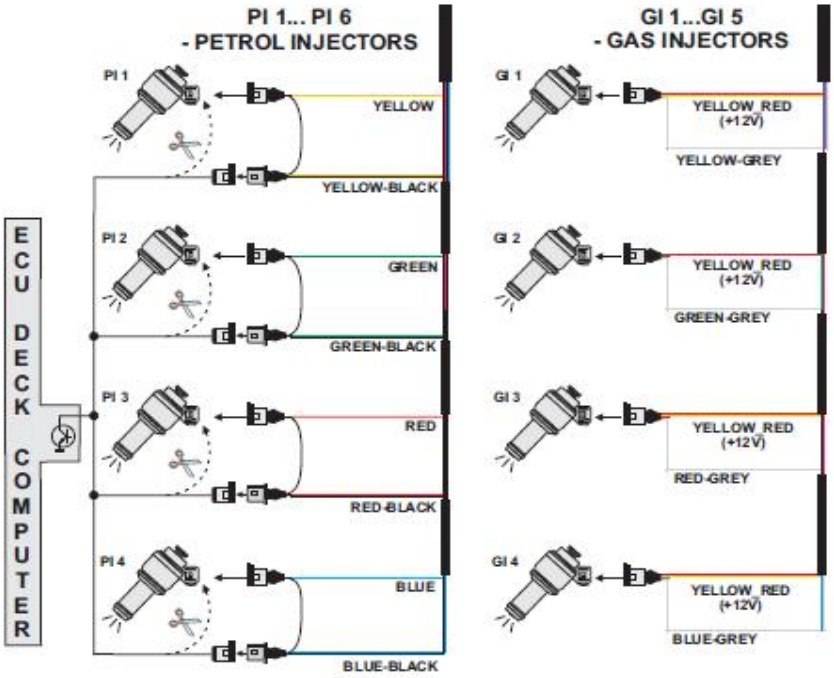


Fig. 1 JXECU08 Connection Diagramfor Vehicle Installation

1.2. Wiring Diagramfor semi sequential systems.



1.3. Connection Diagramfor full group systems.



JXECU08 **Installation Method.**

It is suggested for the wire set to point downwards. Regardless of the type of ECU it is suggested that it is placed in such a way to avoid the negative impact of high temperature and humidity.

Selection of Pressure Regulator

Install the system according to the connection diagrams. It is important to select the proper pressure regulator for given engine power as well as injector nozzles.Improper selection of the pressure regulator in relation to the engine power will result in the pressure regulator inability to ensure nominal LPG pressure, i.e. it will result in pressure drops when the LPG delivery is high (i.e. when the throttle is fully open). When the LPG pressure drops below the minimumvalue programmed in the controller, the systemwill switch to petrol.

Selection of injector nozzles

The injector nozzles selection should also be based on the engine power. The selection of injector nozzles should ensure that at high engine loads and high rpm, the multiplier for a given injection time should be close to 1. For the majority of engines, the injection times equal roughly 15 [ms]. The table below presents the nozzles. diameters depending on the engine power per 1 cylinder. To select the right diameter of nozzles, the engine power needs to be divided by the number of its cylinders.

Nozzle diameter [mm] Reducer pressure 1 [bar]	Engine power per cylinder [KM]
1,8-2	12 – 17
2,1-2,3	18 – 24
2,4-2,6	25 – 32
2,7-2,9	33 – 40
3,0	41 – 48

Note: the above values are estimates only and do not necessarily always reflect the reality.
This can occur e.g. in vehicles with semi sequential or full group (all injectors activated simultaneously) injection. In such cases, the nozzles. diameters will be smaller than those presented in the table above as in these systems the amount of supplied LPG is higher than in full sequence

systems . two times higher for semi sequential injectors and four times higher for full group injectors. In the event .Injection control mode. parameter is set to (depending on the vehicle type) semi sequential or full group, diameter values of injector nozzles should correspond to those indicated in the chart.

2. JXECU08 diagnostic software description

2.1. Controller PC connection

Upon installing the JXECU08 Pluscontroller in the vehicle,connect it to a PC with the JXECU08 software installed via an RS or USB interface manufactured by JX . Prior to starting the software, turn the ignition on (in order to supply voltage to the controller); this is necessary as the controller switches to sleep mode (when it will not communicate with the PC) after app. 10 minutes without power supply. After starting the software . provided the COMport is selected properly . the controller will establish connection with the diagnostic software and .Connected. will appear in the lower left corner of the screen.

Fig. 2 shows the Parameters window.

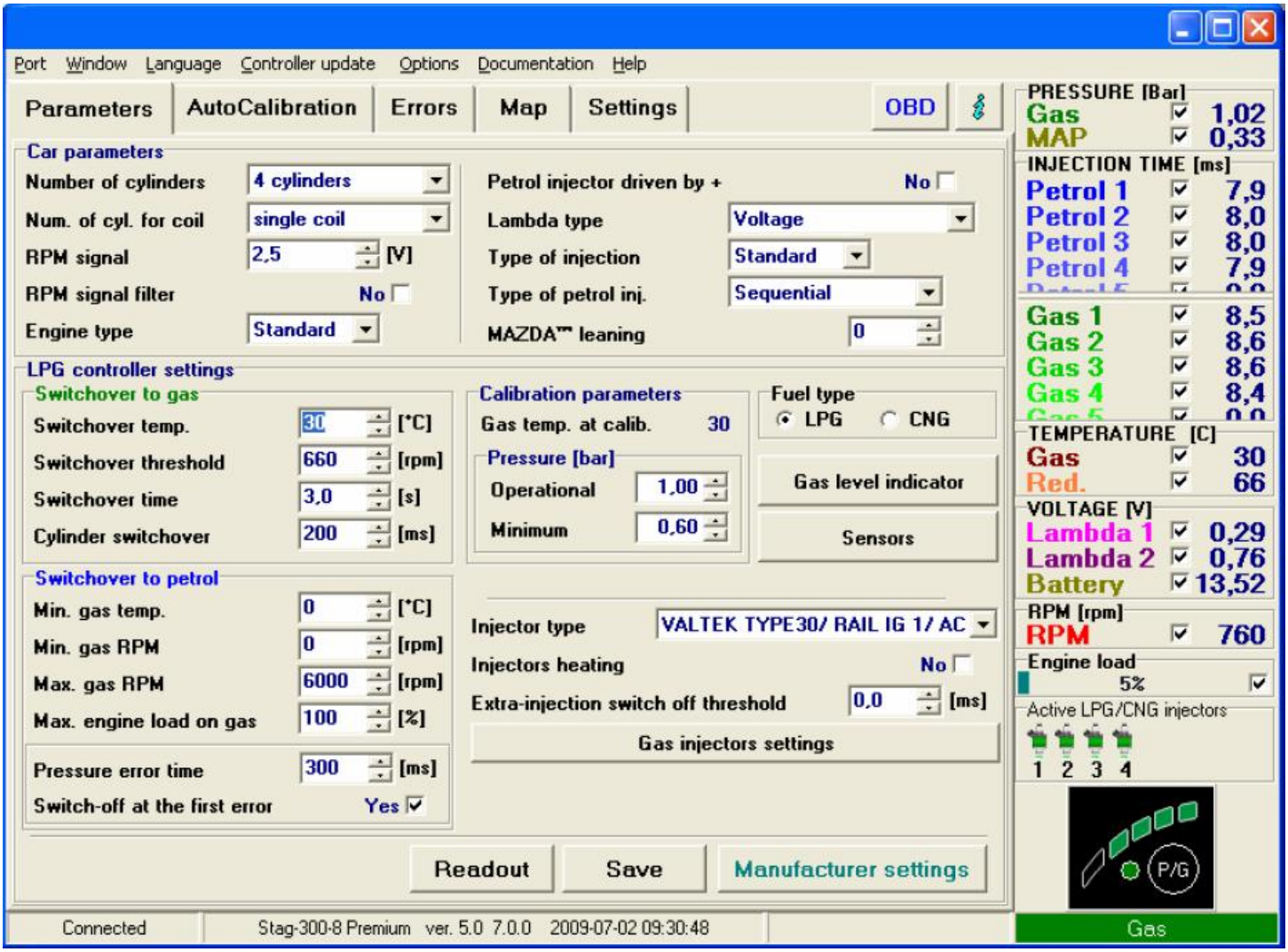


Fig.2 Parameters window.

If you get the "Controller Error" message and "No connection" appears in the lower left corner of the screen, select a different COM port from the Port menu at the top of the screen.

2.2. JXECU08 SOFTWARE version

When the diagnostic software is open, the top title bar shows the version of the software.

2.3. Main menu

The main menu consists of the following options:

- *Port* - changing the communication port, connecting and disconnecting the controller
- *Window* - selecting the software windows
- *Language* - selecting the required software language version
- *Controller update* - updating the controller firmware
- *Documentation* - opening a folder with available documentation
- *Help* - about the software

2.4. Controller Parameters

Clicking the button in the upper right corner will bring up the *Controller Info* window. A detailed description of the *Controller Info* windowis presented later in this manual.

The Parameters window lists a number of parameters which need to be set individually for each vehicle.

The **Car parameters** group contains:

- *Number of cylinders* - number of engine cylinders.
- *Num. of cyl. for coil* - the number of cylinders for each ignition coil
- *RPMsignal* - RPMsignal source

RPMdetection threshold in Volts. Set the detection threshold to a value ensuring proper revolutions reading fromthe controller. E.g. for impulses originating in a petrol engine usually equal app. 5 [V], set the detection threshold to app. 2,5 [V]. For impulses originating fromthe ignition coil, set the threshold to app. 7 [V].

NissanMicra is an exception. Its computer ignition impulses equal app. 1,4 [V], in which case the detection threshold needs to be set at app.1,0 [V].

For some Renault Megan models, the detection setting needs to be set at app. 10 [V]

- *RPMsignal filter* - Switching on (YES) and switching off (NO) of RPMsignal filtration. In the case of .American. cars, correct reading of RPMvalue can be difficult, so this option should be switched on. In other cases, it should be switched off.
- *Engine type* - engine type, Standard - normally aspirated engine with no Supercharger, Turbo-supercharged engine
- *Petrol Injector driven by "+"* injection signals reading in systems where signals are "positive", i.e. grounding is the common signal for all injectors and the controlling signals are up to 12 [V].
- *Lambda type* - type of the installed lambda probe:

  -voltage - standard voltage probe. Two voltage probes can be connected simultaneously.

  -UEGO > voltage - wide band UEGOlambda (current).

  The controller shows on an oscilloscope values fromthe probe in the same formas for a voltage probe. Only 1 wide band lambda can be connected at any given time.

  -UEGO > full range - wide band UEGO lambda (current).

  The controller shows on an oscilloscope values in Volts. This makes it possible to watch the entire working range of the UEGO probe, i.e. fromlean to rich mixtures. Only 1 broad-band probe can be connected at any given time.

Do not select .UEGOprobe. for a voltage probe as this may damage the probe.Refer to the Connection Diagram!!!

- *Type of Injection* - type of injection used in the car,

  -Standard - standard indirect injection, petrol injectors with no current limit.

-Renix - indirect injection system, petrol injectors with .Renix. current limit

- *Type of petrol Inj. - type of petrol injectors control*
  - *Sequential: each petrol injector is controlled froma separate channel in the petrol controller.*
  - *Semi sequential: petrol injectors are controlled in pairs, i.e. 2 injectors are Controlled froma single channel in the petrol controller.*
  - *FullGroup: petrol injectors are controlled froma single channel in the petrol controller.*
- *Mazda leaning TM - in some types ofMazda, the petrol controller can (in some conditions) alter fromsequential into semi sequential controlling. It can be easily noticed by observing the LPG/CNG injection time indicator on the 2D map.When the petrol controller alters fromthe sequential into semi sequential controlling (at the same load), the petrol injection time is reduced by approximately 50[%]. The vertical axis indicator (for constant load) changes its injection time value position e.g. from8 [ms] to 4 [ms]. In the case of such a controlling type in the LPG mode,"jerking" can occur, resulting fromthe fact that the mixture is too rich for the semi sequential mode. In order to eliminate the above mentioned problems,"Mazda leading TM. "function should be used. The weakening coefficient should be properly set. According to the research, its value should be approximately 17.However, the value can be different, depending on the engine.*

The **LPG Controller Settings** window lists the following groups of parameters:

Switchover to gas - parameters related to switching frompetrol to LPG.

- *Switchover temp.* - LPG pressure regulator temperature required for the controller to switch to LPG,
- *Switchover threshold* - engine rpmrequired for the controller to switch to LPG.For rpm set to <700, the controller switches to LPG at idle run.
- *Switchover time* - time after starting the engine when the controller can switch to LPG.
- *Cylinder Switchover* - time elapsing between the switching of subsequent cylinders. E.g. with the setting at 200[ms] for a 4 cylinder engine, the switching frompetrol to LPG or LPG to petrol will take 4*200[ms]. This works regardless of whether the petrol injection systemis the so called full sequence or not. **Setting the switching time to 0 will result in the switching from petrol to LPGor vice versa and turning on and off of the solenoid valves without any delay.**

Switchover to petrol - parameters related to switching fromLPG to petrol.

- *Min. gas temp.* - min. LPG temperature; when lower, the controller will switch over to petrol.
- *Min. gas RPM* - min rpm; when lower, the controller will switch over to petrol.
- *Max. gas RPM* - engine rpm; when higher, the controller will switch to petrol
- *Pressure error time* - amount of time with the LPG pressure lower than minimal before the controller switches to petrol and reports: .LPG pressure too low..
- *Switch off at the first error* - with this option selected, the controller will switch to petrol when the LPG pressure drop is detected.When unselected, the controller will switch some cylinders to petrol when the LPG pressure is detected to lower LPG usage.
- *"Max. engine load on gas"* - the maximumload value in the LPG mode, above which the controller switches to petrol. This option is very useful for the engines in the case of which petrol injectors can be fully opened. In such a situation, the LPG controller can only open LPG injectors permanently as well. However, corrections, e.g. resulting fromchanges in the LPG pressure, will be no longer possible. The moment when petrol injectors are fully open corresponds to the load value of 100[%]. If petrol injectors become fully open, the *.Max. LPG load.* parameter should be set to approximately 95 [%]. This will result in the controller switching to petrol before full opening of LPG injectors.

Calibration parameters - parameters related to controller calibration.

- *Gas temp. at Calib.* - LPG temperature at which the controller was calibrated.

- *Pressure*

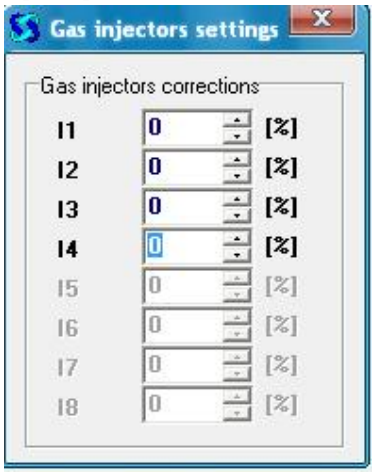
  Operational - LPG pressure at which the controller was calibrated. This setting can be altered manually. **However, each change of the operational LPG pressure requires multiplier map calibration!!!**

  Minimum - when the pressure is lower than minimum, the controller will switch to petrol if the duration of min. pressure exceeds the ***Pressure Error Time.***

Remaining parameters in the **LPGController Settings** group**:**

- *Fuel Type*- type of fuel in the LPG system
- *Injector Type* - type of the LPG injector. **Changing the injector type requires re auto calibration or multiplier map calibration!!!**
- *Gas Injectors Settings* - calibration of particular LGP injectors.
- *Gas level indicator* - LED thresholds setting. This button is used to set the lowLPG LED on/off threshold settings as well as to select the LPG level sensor (this is explained in more details later in the manual).
- Injectors heating - enabling this option results in starting the procedure of heating LPG injectors after a longer stopover. Activation of the procedure is indicated in the oscilloscope diagramwith a red line and flashing active LPG injectors.
- *Extra- injection switch off threshold* - petrol injection impulses belowthe set value will be ignored by the controller, meaning that the controller will not generate the LPG injection impulse if the petrol injection impulse is belowthe set value.

Clicking the *Gas Injectors Settings* button will open up the following window in which the LPG injectors can be calibrated:



Use this window to calibrate (in %) the LPG injectors. These settings enable a correction of the fuel mixture for each cylinder. This is used e.g. to correct the injection time variations present in a .V. type engine cylinders.

To calibrate the injectors, use the following procedure: Upon auto calibration, check the **petrol injection times** for each cylinder when using petrol. Turn the LPG injectors on, one at a time, and observe if there are any differences in the injection times after switching from petrol to LPG. Adjust the % settings **(only when necessary!)** for each injector so that switching to LPG one injector at a time will not result in changing the **petrol injection times.**

WARNING!!! Use this option as a last resort, i.e. when sure that the installation was performed properly, all mechanical issues have been eliminated and injection times variations for given injectors are still present when using LPG. Do not ever use injection strip collector pipes of different lengths and then the injectors. calibration to accommodate this difference!!! Also never use this option when the systemis not in a perfect working condition or when some of its elements have worn out.

Using this option in a manner not consistent with the above instructions may result in damage to the car!!!

The correction window may be opened regardless of the selected tab, i.e. the map tab may be opened and the correction window on top of it.

There are 3 buttons at the bottomof the Settings tab used to performthe following actions:

- Read - read the controller settings froma file
- Save - save the controller settings to a file
- Default - restore default controller settings

2.5. Controller Info

To bring up the *About gas ECU* window, click the button in the upper right corner of the screen or select .Gas controller info. in the Help menu.

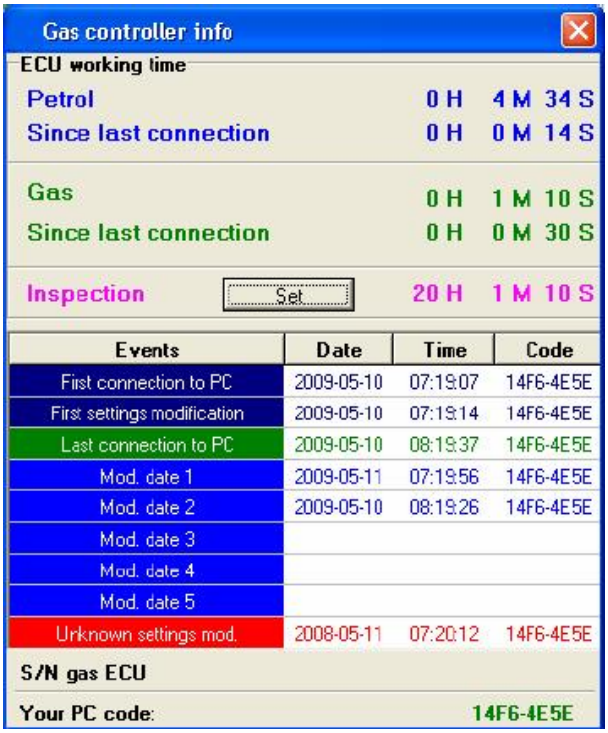

Gas controller info
ECU working time
Petrol 0 H 4 M 34 S
Since last connection 0 H 0 M 14 S
Gas 0 H 1 M 10 S
Since last connection 0 H 0 M 30 S
Inspection Set 20 H 1 M 10 S
Events Date Time Code
First connection to PC 2009-05-10 07:19:07 14F6-4E5E
First settings modification 2009-05-10 07:19:14 14F6-4E5E
Last connection to PC 2009-05-10 08:19:37 14F6-4E5E
Mod. date 1 2009-05-11 07:19:56 14F6-4E5E
Mod. date 2 2009-05-10 08:19:26 14F6-4E5E
Mod. date 3
Mod. date 4
Mod. date 5
Unknown settings mod. 2008-05-11 07:20:12 14F6-4E5E
S/N gas ECU
Your PC code: 14F6-4E5E

Fig. 3 Gas controller info window

The Gas controller info window (Fig. 3) shows the following parameters:

ECUworking time:

- *Petrol - total working time of the controller using petrol listed in the following format:* H . hours, M . minutes, S . seconds.
- *Since last connection* . working time of the controller using petrol since its last connection with a PC.
- *Gas* total working time of the controller using LPG
- *Since last connection* . working time of the controller using LPG since its last connection with a PC.
- *Inspection* . Service Schedule. When the controller reaches the working time using LPG set in this field, every time the ignition key is switched off the controller will produce an acoustic signal reminding of the inspection. Clearing the Inspection Schedule is explained below.

To set the Service Schedule, click the .Set. button in the About gas ECU window. The following window will pop up (Fig. 4):

Fig.4 set inspection window

The next service visit time is calculated on the basis of mileage. The default setting is 1 h = 50 km, yet it is configurable. The above window shows the next service visit set to 1000 km, which in this case equals 20 hours of work.

To clear the service schedule, select .Disabled., in which case the controller will not monitor the service schedule.

Belowthe working times, the Controller Info lists the following types of registered events:

- *First connection to PC* . date of the first controller PC connection.
- *First settings modification* . first modification of the controller settings. **If these fields do not showdates but instead the .???. symbols, it means an error occurred in the Controller Info. Time information has been lost and the controller will start counting the times fromthe beginning.**
- Mod. date 1 ÷ Mod. date 5 . a list of controller settings modifications. Fromthe most recent ones till the oldest.
- Unknown settings mod. . This happens when the controller.s settings modification is performed with a date earlier than a previously performed modification.

Each event is also accompanied by a .code. linked to the PC on which the modification was made.Thus knowing the modification date as well as the PC code, it is easy to determine whether any modifications have been performed by anyone else.

The bottomof this window shows additional information:

- *S/N gas ECU* . the serial number of the controller. Not available for older versions of controllers.
- *Your PC code* . The code of the PC on which the AcGasSynchro software is currently used.

2.6. Signals, injectors, switchboard

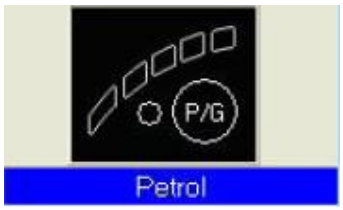
On the right side of the window (**Fig. 7)** there are the .Signals. and .Injectors. windows. The .Signals. windowshows the following signals measured by the controller:

- *Gas pressure [bar]* . LPG/CNG pressure value (the difference in the pressure regulator pressure and the suction collector pressure)
- *MAP pressure [bar]* . pressure inside the suction collector (absolute pressure value)
- *Injection time [ms]* . petrol injection time
  Petrol 1 - Petrol injection time for Injector 1
  Petrol 2 - Petrol injection time for Injector 2
  Petrol 3 - Petrol injection time for Injector 3
  Petrol 4 - Petrol injection time for Injector 4
  Petrol 5 - Petrol injection time for Injector 5
  Petrol 6 - Petrol injection time for Injector 6
  Petrol 7 - Petrol injection time for Injector 7
  Petrol 8 - Petrol injection time for Injector 8

- *Injection time [ms]*. Gas injection time
  Gas 1 - Gas injection time for Injector 1
  Gas 2 - Gas injection time for Injector 2
  Gas 3 - Gas injection time for Injector 3
  Gas 4 - Gas injection time for Injector 4
  Gas 5 - Gas injection time for Injector 5
  Gas 6 - Gas injection time for Injector 6
  Gas 7 - Gas injection time for Injector 7
  Gas 8 - Gas injection time for Injector 8
- *Gas temperature[°C]* - LPG temperature at the pressure regulator output

- *Red. Temperature [°C]* - liquid temperature at the reducer
- *Lambda 1 voltage [V]* - voltage at the lambda probe 1
- *Lambda 2 voltage [V]* - voltage at the lambda probe 2
- *Battery [V]* - voltage at the controller.s power supply
- *RPM[rpm]* - engine revolutions
- *Engine load* - current engine load value expressed in per cent.

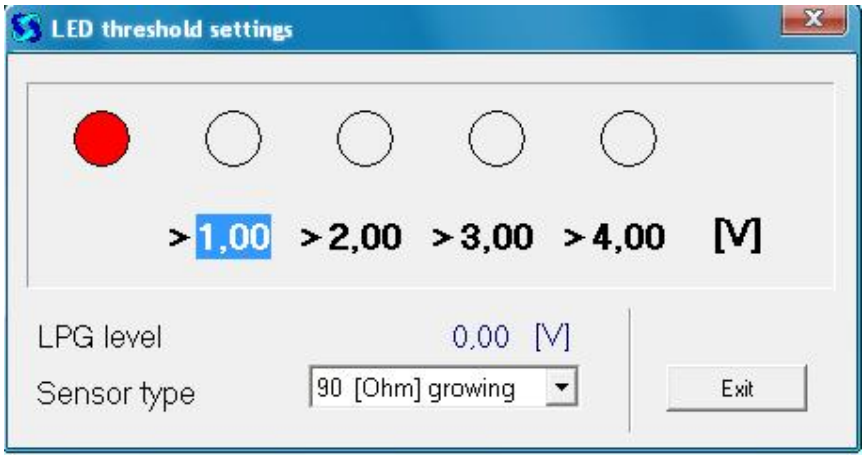
All the above described signals are also visible on the oscilloscope. To turn off a given signal on the oscilloscope, click on it. By clicking on the name of a given signal you can change its colour on the oscilloscope.
Belowthe signals (**Fig. 2)**) there is a field with active LPG/CNG injectors. This is used to turn off selected LPG injectors. E.g. in a 4 cylinder engine, normally 4 LPG injectors are active (green). To turn off a selected injector, click on it and the corresponding petrol injector will be turned on. This is useful in diagnosing a mechanical damage on an injector.When the power is switched off with the ignition key, all LPG injectors are turned on.
There is a LED switchboard under the Signals and Injectors windows.



There is a button on the LED switchboard for changing the fuel type. The LED next to the switch signals the controller status:

- off - petrol
- on - LPG/CNG
- blinking - auto mode

The currently used fuel type information is shown under the switchboard. There are 5 LEDs at the top of the switchboard showing current LPG/CNG level in the tank. Click on one of the four LEDs to enter the LED threshold settings.



Use this window to set the voltage which will turn on a given LED. The LPG level sensor type is also set here as well as the LPG level voltage.

When the “LED threshold settings” windowis active, changing the LPG level on the sensor results in immediate change of LEDs status. This is used to check the proper activity of the full tank sensor and the LED bar.When this window is closed (normal activity) the LED level change on the sensor is shown on the LED bar after a very long period of time.

2.7. Auto calibration

The auto calibration window is used to calibrate the engine at idle run. Start the calibration after the engine is turned on and the lambda probe begins to work. During the auto calibration the engine should work at idle run. Switch off air conditioning and lights and do not turn the steering wheel. During the calibration, the controller will automatically switch from petrol to LPG. The controller will be automatically switching on selected LPG cylinders. Once the auto calibration is complete, the controller displays a message informing the auto calibration has finished successfully. The following messages may appear during the calibration:

- Engine rpmtoo low [rpm]. engine rpmare too low, please check the .Num. of cyl. for coil. setting
- No injection at the injector . no signal at the petrol injector . check the connection of the emulator's bundle.
- Collector pressure [bar] incorrect . the collector pressure may be incorrect, check the collector.s pressure sensor settings.

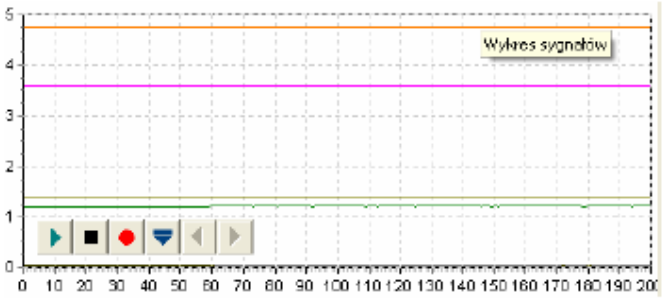
Available calibration options:

All injectors together- in the case of standard calibration ("*All injectors together*" option is switched off), the controller switches one cylinder to LPG first and then switches the remaining cylinders one by one. If the *All injectors together*. option is switched on, the controller will switch on all injectors at the same time.

This option can be very useful in the case of some "full group" injection systems, for which it is not possible to separate individual petrol injectors and 4 injectors form a single primed module with two terminals. This option should be switched on as well if fuel strip pressure emulators or "Renix" emulators are used.

If this option is selected, the "Cylinder switchover" parameter will be automatically set to 0.

2.8. Oscilloscope



When the auto calibration or map tab is selected, the oscilloscope is visible. The oscilloscope shows all the signals described in point 2.5. The control buttons have the following functions (from left to right):

- Start the oscilloscope
- Stop the oscilloscope
- Save current oscilloscope display
- Load saved oscilloscope display
- Decrease the number of displayed points (only for loaded graphs)
- Increase the number of displayed points (only for loaded graphs)

When the controller works with LPG, a continuous line appears at the top of the oscilloscope; its colour corresponding to the LPG ignition time.

2.9. Errors

The Error windowshows the following field:

- Continuous acoustic signal for errors . if selected, acoustic signals will informof an error until manually turned off by the user. If unselected, the acoustic signals will remain on only for a set amount of time.

The Actual Errors window shows current errors recorded by the controller and the Saved Errors window shows errors recorded during the controller.s operation.
The following errors may appear during operation:

- **Injector No. [.] Error** - no LPG injector No. [.] or injector damage
- **Voltage Error** - voltage at the controller.s power supply lower than 9 [V]
- **LPG pressure too high**. the LPG pressure has been two times higher than operational pressure for 60

seconds (a reducer problem)

- **LPG pressure too low** . the LPG pressure has dropped under the min. pressure value for a set amount of time.
- **No petrol injection** . the controller has detected a lack of petrol injector signal for one or more petrol injectors.
- **Data error, check settings!** . the controller has detected a settings error, check all controller settings.
- **Power supply voltage too low for LPG/CNG!** . the controller power supply is too low to work with LPG.
- **Working time error** . Controller Info has been damaged and automatically deleted. **In this case, the First PC Connection and First Settings Modifications info will not be shown.**

The following warnings may appear in theWarnings window:

- **LPG injectors fully open!!!** . Check the lambda probe at full engine load . **LPG injection loop, i.e. an LPG injection.s started before the previous LPG injection ended. If the lambda probe is .rich. at the time of this message, this warning may be ignored. Otherwise, replace the injectors. nozzles with higher diameter ones to decrease the multiplier.**
- **Inspection of Gas system required!!!** The installation requires a periodical service visit. To delete this message, go to the Controller Info settings, click .Set Inspection. and either set the next service visit in kilometres or select .Off. in which case the service reminder will be inactive.
-

There is a .Delete. button at the bottomof the screen used to delete all registered errors.

2.10. 2DMultiplier Map

The Map windowshows the LPG controller 2D maps.

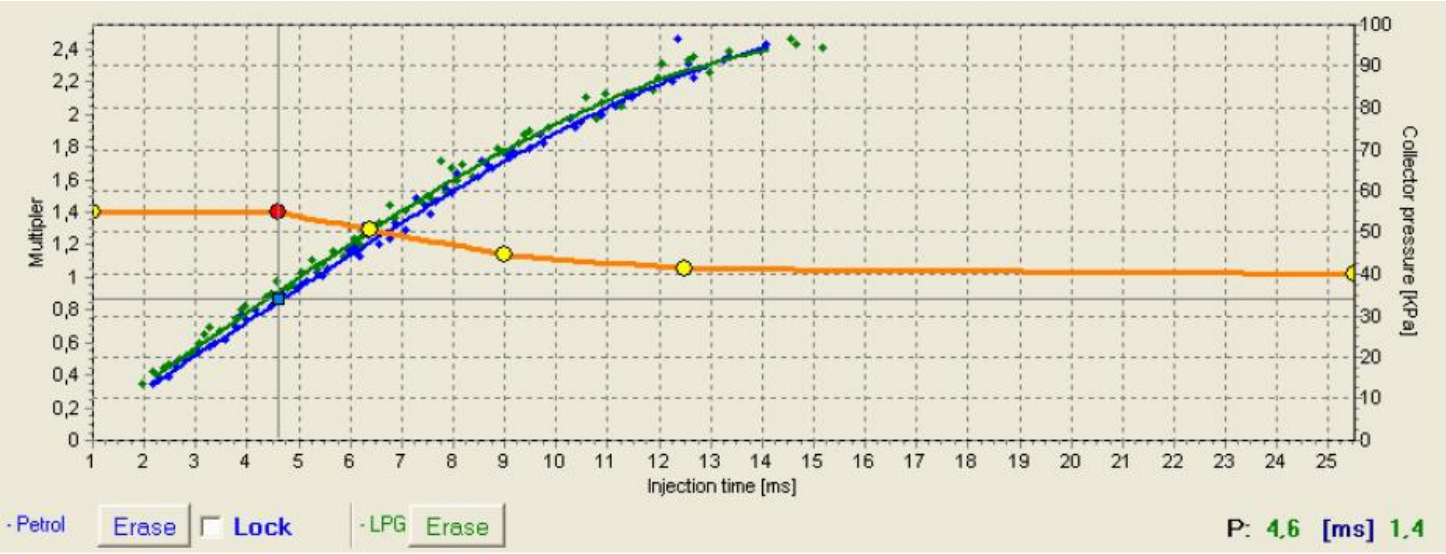


Fig. 16 shows 3 maps:

- Multiplier map - orange
- Petrol injection time map (with petrol) -blue
- Petrol injection time map (with LPG) - green

The multiplier map is orange. The left axis of the co ordinate system (Multiplier) and the lower axis (Injection time [ms]) relate to the multiplier map. The multiplier map is used to set the multiplier for a given petrol injection time. The yellow points visible at the map are used to set the multiplier. Upon auto calibration, 2 yellow points appear on the left most and right most positions with 4 additional points in between. To move a given point, select it by clicking on it. The value of a selected point is
displayed at the lower right corner of the map. To move the points on the map, use the following keys:

- ←-left arrow moves the point to the left (change of the injection time for a given point)
- →-right arrow moves the point to the right (change of the injection time for a given point)

- ↓ -down arrowdecreases the multiplier for given injection times
- ↑ -up arrowincreases the multiplier for given injection times
- “Insert” (when a point is active) or right mouse button-add a newpoint
- “Delete”- delete a point fromthe map
- “Page Up” -move the map up
- “Page Down” - move the map down
- “Ctrl”+ ← , or “Ctrl” +→ change the active point (move to the next one)

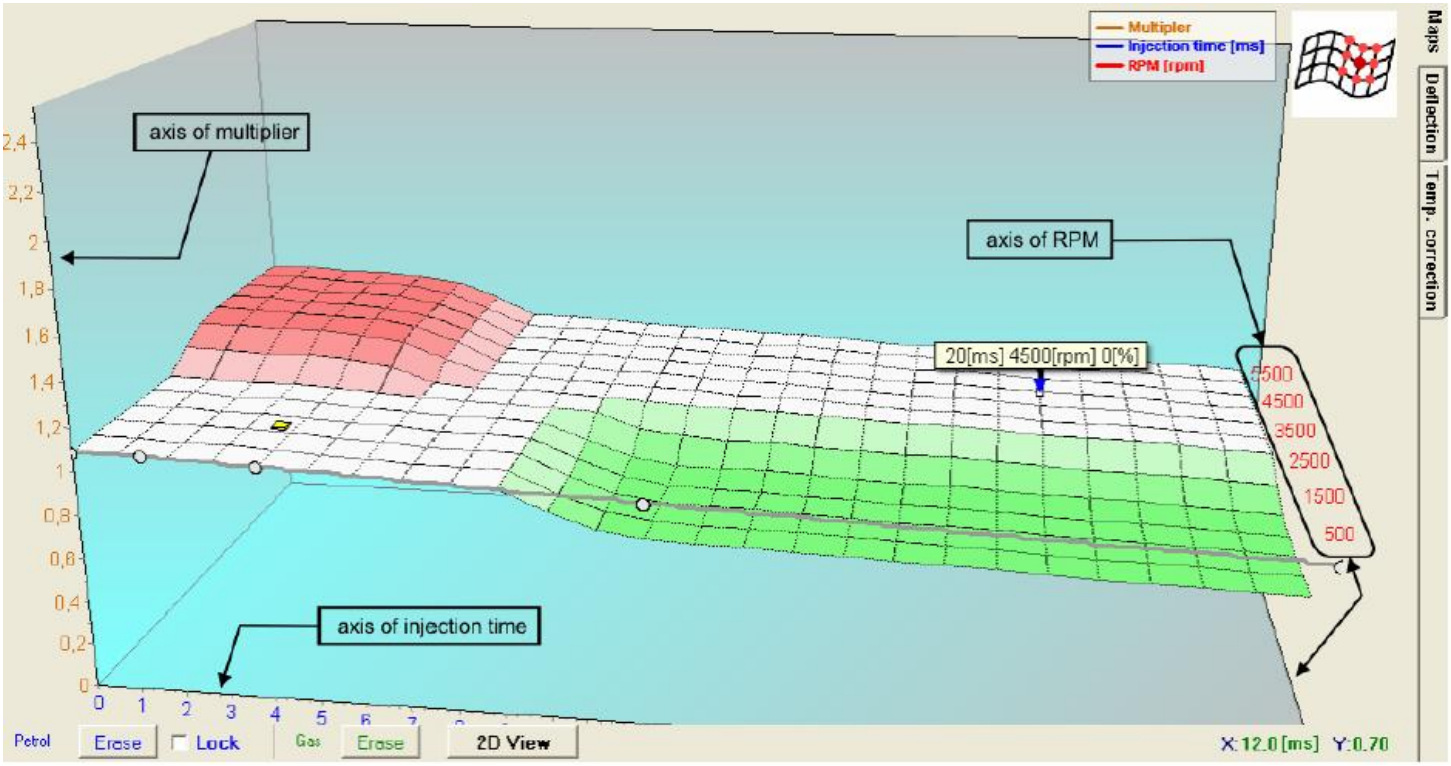
When the “Shift” key is pressed in, the map movement speed is multiplied by 10 (fast movement).
When no point is selected, the ↑ ↓ arrows move the entire map.
Apart fromthe multiplier map, there are two other maps in the window. The blue map represents the petrol injection times (with petrol). The right axis Collector pressure [Kpa] and the lower axis Injection Time [ms] relate to this map. The map consists of blue points. After collecting the data, the controller turns these points into a continuous line. The same applies to the so called LPG map, i.e. the map of petrol injection times (with LPG) which is green.

After the controller collects both maps, i.e. the petrol and LPG maps, the Deflection tab becomes active where a red line shows the difference between petrol and LPG.

The map window in Fig. 16 shows a blue square marker; its position changes vertically depending on the collector pressure and horizontally depending on the petrol injection times. It is very useful during map collection as it shows the load and injection times of the engine.
The “Erase” button is used to delete the petrol and LPG maps. The “Lock” button situated next to it is used to block the petrol map once it is collected by the controller, i.e. the controller will not modify the petrol map once it is collected (drawn with a continuous line).

2.11. 3D multiplier calibration map

After clicking on the “3D view”button, a 3D multiplier calibration map will open in the “Map” window.

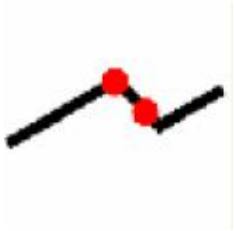


The 3D map shows the multiplier map described in point 2.12. The multiplier map makes up a plane.One axis of the plane represents the petrol injection time [ms], while the other represents engine revolutions [rpm]. The map makes it possible to calibrate the multiplier depending on engine revolutions. This is shown In Fig. 17. It is possible to enrich/weaken the mixture

for a defined petrol injection time and revolutions by means of calibrating the multiplier on the 3D map.

A yellow (square) marker seen in the diagramshows where on the plane the engine currently is. The marker position depends on the current rpmvalue and of the petrol injection time.

The following working modes are available when using the 3D map:



- Multiplier change

This mode is used to change the multiplier characteristics (plane) by following steps analogous to those in the case of the 2D map. Editing in this mode is analogous to the same function in the 2D map. The mode is activated by means of clicking with the left mouse button beyond the plane marked out by the multiplier map, or by means of pressing the TAB key (switch fromthe previous mode).

- Multiplier calibration (change in adjacent fields)

This mode is used to calibrate the multiplier for a given range of engine revolutions and of the petrol injection time. In order to calibrate the multiplier, the area which is to be calibrated must be selected by moving the mouse with the left button pressed over this area.

Another method is to press the SHIFT key and, while holding it, to select the appropriate area by pressing arrow keys:

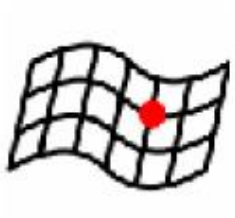
- ← Left arrow
- ↑ Up arrow
- → Right arrow
- ↓ Down arrow

Having marked the area which is to be calibrated, specified actions can be performed by using the combination of the CTRL key and one of the keys below:

- ↑ Arrowup (higher calibration/richer mixture)
- ↓ Arrowdown (lower calibration/leaner mixture)

Pressing the SHIFT key in the course of the multiplier calibration will multiply the required step by 10.

The mode is activated by means of pressing the TAB key (switch fromthe previous mode).



- Multiplier calibration (no change in adjacent fields)

This mode is used to calibrate the multiplier for a given range of engine revolutions and of the petrol injection time. This mode functions in a way analogous to .Multiplier calibration (change in adjacent fields).. The difference is that only the marked area undergoes changes while adjacent fields remain unchanged.

The mode is activated by means of pressing the TAB key (switch from the previous mode).

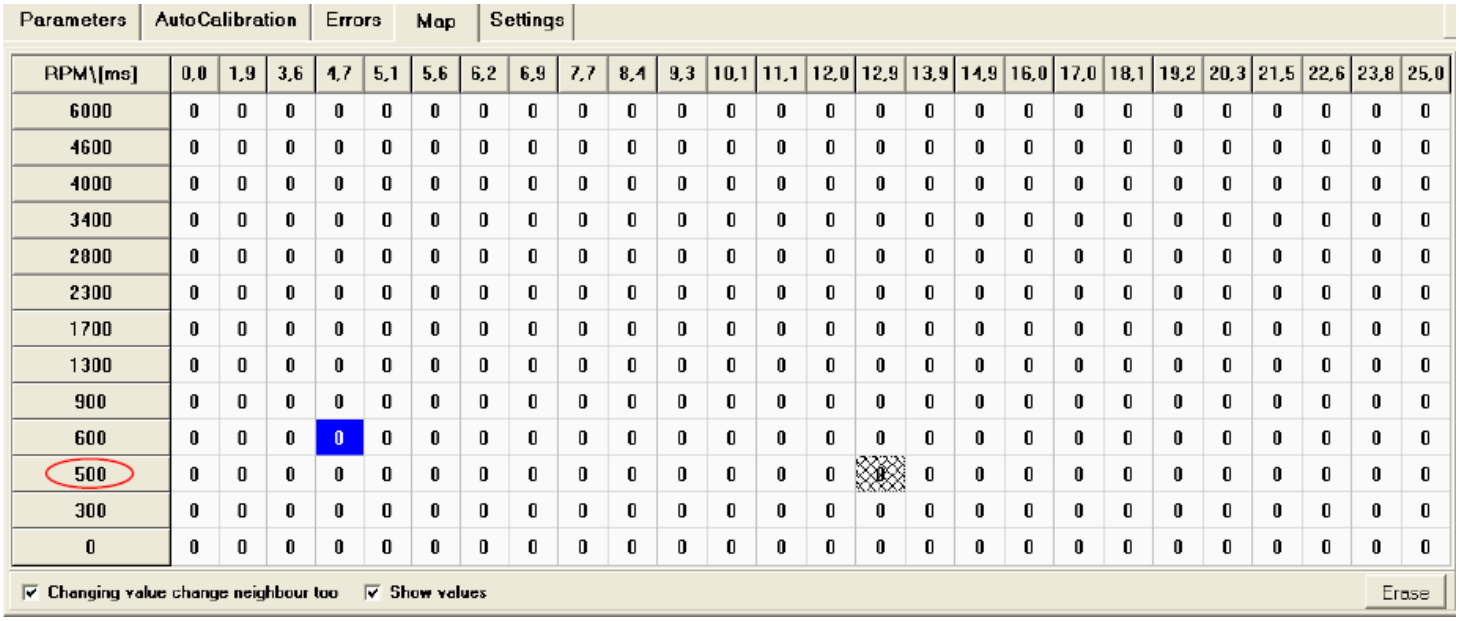
- Rotating the diagram

This mode is used rotate the 3D diagram. In order to rotate the diagram, press the right mouse button and move the mouse so that the desired result is achieved. Another method is to rotate the diagramby pressing the following arrowkeys:

← Left arrow
↑ Up arrow
→ Right arrow
↓ Down arrow

2.12. 3D multiplier calibration map .digital. (for JXECU08+ only)

Upon pressing the "RPM calibration"tab, a digital multiplier calibration map is displayed in the map window. This map is a different method of visualising the 3D map described in 2.11. The digital map offers newpossibilities presented below.



RPM\[ms]	0.0	1.9	3.6	4.7	5.1	5.6	6.2	6.9	7.7	8.4	9.3	10.1	11.1	12.0	12.9	13.9	14.9	16.0	17.0	18.1	19.2	20.3	21.5	22.6	23.8	25.0
6000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4600	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3400	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2800	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2300	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1700	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1300	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
900	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
600	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
500	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
300	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Thanks to the "digital" multiplier calibration map shown above, it is possible to modify the multiplier according to rpmin the same manner as in the case of a "graphic"3D map, also as regards the method of operating it by means of a keyboard. All changes to the "graphic" map will be represented in the "digital" map and vice versa because physically there is only one map in the controller memory, only the method of presentation is different.

A far as map modifications are concerned, the following additional options are also available:

"Changing value change neighbour too"- (if selected) in the case of modifying the selected area, the neighbouringfields are modified as well.

"Show values" -(if selected) the controller displays calibration values in per cent.

In this display mode, the "Erase" button can be seen. By pressing this button, all map settings can be deleted (the map can be reset).

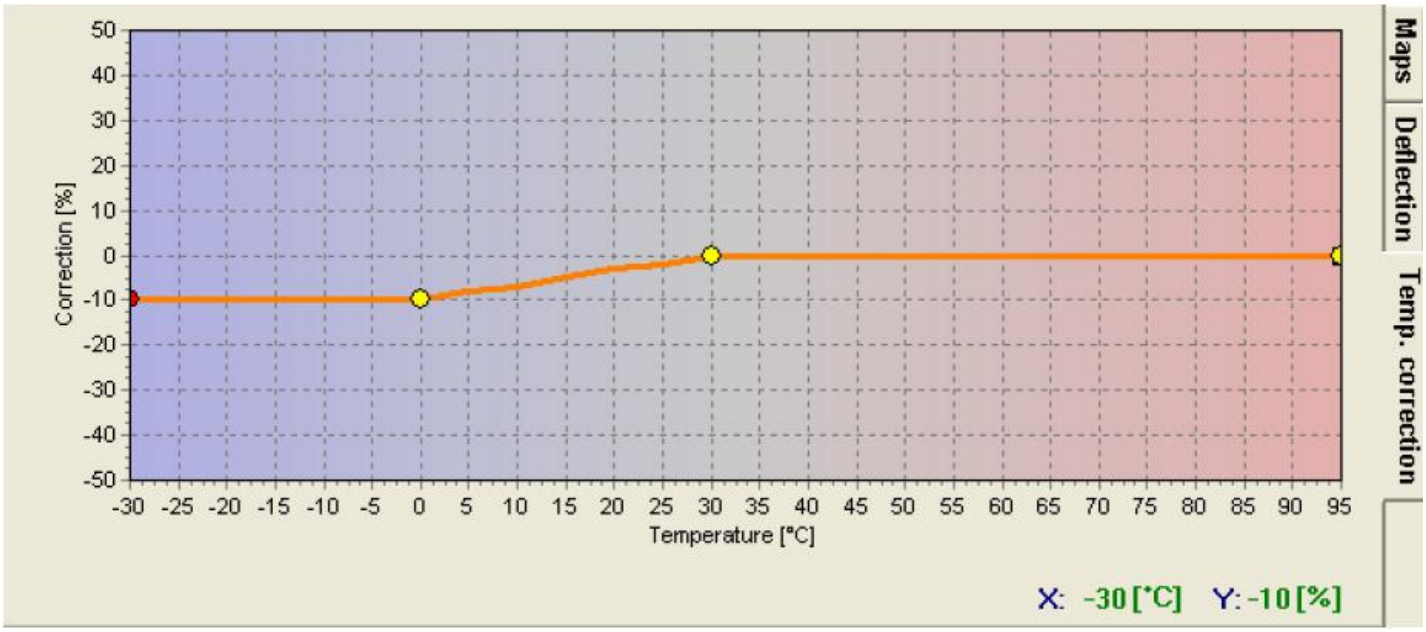
The vertical axis shows rpmvalues for individual intervals on the map. The red border marks the boundary between the first and the second rpminterval. If intervals are set as presented in Fig. 19 , the second interval operates from300 to 500 rpm, while the third interval operates from500 to 600rpm.

The boundaries between individual intervals can be regulated by clicking on the correct field and entering a newinterval boundary value. Thanks to this option, it is possible to adjust the mixture composition to precisely defined rpmrange and injection time. The user is not limited by preset intervals. For example, the operating range of the third interval can be modified to 500 800 rpm.

The blue square which can be seen in the map changes its position within the horizontal axis depending on the actual petrol injection time value and within the vertical axis depending on the actual rpmvalue.

2.13. Gas temperature calibration map

The Gas calibration map opens in the Map windowafter selecting the .Temperature calibration. tab.



The controller has the gas temperature multiplier calibration value permanently set. The gas temperature calibration map enables percentage adjustments of this calibration value. Editing the gas calibration map is analogous to the same function performed in the case of the multiplier map.

2.14. Controller update

To update the controller, connect it to the diagnostic software and turn the engine off. Select “Controller update”from the main menu and select JXECU08+ Plus, depending on the connected controller type. The .Controller update. window will pop up.
The “Controller Parameters” window shows the information on current controller firmware version. The “Available actualizations” window includes a list of updates available for the connected controller. Loading an update not included in the program directory requires clicking “Load update” and selecting the update file. Loaded update should be included in the list of available updates. Click“Update” once the update file has been selected from the list. When the progress bar reaches 100%, the controller will disconnect and then re connect. The new version number should appear at the bottomof the screen and should reflect the version number of the update file.

Should the update go wrong the update window will be opened automatically upon connecting with the controller. Performthe update procedure again.

3. controller programming

3.1. Auto calibration

Prior to starting the auto calibration, start the engine and wait until the lambda probe begins to work.During the auto calibration the engine should work at idle run; do not increase rpm, switch off air conditioning and lights and do not turn the

steering wheel as this may cause errors during the auto calibration. During the auto calibration, watch carefully petrol and LPG injection times. If LPG injection times are shorter than petrol injection times, the injector nozzles may be too large and should be replaced with smaller diameter ones. When the auto calibration is complete, 2 extreme yellow points and 4 additional points in between will show up on the multiplier map. The second left point is the point of engine operation at idle run i.e. the point of operation during auto calibration. The multiplier.s value for this point should be between 1.1 and 1.6; if the value is greater than 1.6, longer
times of petrol injection i.e. greater load and high rpm, may cause overlapping of injection times i.e. one LPG injection will begin before the previous one ends (looped injections). In such a case, the controller will display the .Too long injection time. error message. **However, in such a case, check the operation of the lambda probe; if it is in the .rich. mode and the vehicle drives without problems, the error can be ignored.**

3.2. Collection of the petrol injectionmap with petrol (petrol map)

Having finished the auto calibration, switch over to petrol and drive the vehicle for app. 4 km to collect the petrol map. During the collection of the map try to drive without changing gears e.g. at the 4th gear and in a way making the lambda probe to .work. i.e. changing its mode fromweak to rich.Blue points should appear during the collection of the map. To collect the map quicker, adjust vehicle load in such a way causing newpoints to be collected in places which are still empty. **Collection of maps is performed without participation of the diagnostic software, thus can be done with the PC disconnected.** However,collecting the map while the PC is connected and the diagnostic software running is quicker and enables the operator to see what is actually happening to the vehicle. When the controller collects sufficient number of points, the map will be drawn with a continuous line and the petrol map collection is finished.

3.3. Collection of the petrol injection map with LPG(LPG map)

Having collected the petrol map, switch to LPG and collect the LPG map in the same way the petrol map was collected. The LPG map should be collected in the same road conditions and with similar loads as the petrol map. The LPG map is drawn with green points. Having collected sufficient number of green points, the map will be drawn with a continuous green line. If the controller is set properly (the multiplier characteristics selected properly), the petrol and the LPG maps should match. If t h e
maps do not match, the multiplier characteristic should be corrected at the points where the maps do not match (the lower axis of co ordinates for injection times). If the LPG map is collected with the PC connected and the diagnostic software running, it is possible to immediately correct the multiplier characteristics when the collected green points do not match with the petrol map. It is even strongly recommended to use the PC in this way as if the multiplier characteristics differ strongly from the required ones, the controller starts to switch over and . in the extreme case . can activate the “check”signal lamp. When correcting the multiplier characteristics, make the points on the LPG map match with the petrol map. Once both maps match, the characteristics are properly set.

3.4. Checking if maps match, verification of deviations

Having collected the petrol and LPG maps (both maps drawn with continuous lines) check the deviation between them. In the **Map** window there is the “Deflection” button located on the right. Press it to see the deviation graph drawn with a red line. If the deviation fits within ± 10%, the controller is programmed properly; otherwise, the multiplier characteristics should be corrected at points where maps do not match.

3.5. Controller manual setting

The controller may also be set up manually, which . provided sufficient experience has been gained-may prove quicker than the above described procedure.

Start with the auto calibration in the same way as described above (this is necessary to ensure the controller works properly, see 3.1). If the auto calibration finishes properly and the multiplier values are correct for the calibration point, switch the engine to petrol and take it for a ride. The multiplier characteristics need to be set in the following way:

Drive the car with a constant load, i.e. the petrol injection times should be stable. Adjust the engine loads so that the injection times equal e.g. app. 5 [ms]. The blue marker will help determine the injection times as it is location on the horizontal axis is determined by the injection times. Next, switch the car to LPG and watch the blue marker for variations in injection times when compared with the earlier petrol injection times. If the injection times decreased (the marker moved to the left) it means that for the selected injection times the multiplier is too high (the mixture is too rich). In this case, lower the multiplier value for the 5 [ms] injection time (in our case). If upon switching to LPG the blue marker moves to the right, it means the mixture is not reach enough and the multiplier needs to be brought up for given injection times.
The procedure described above should be performed for a few different injection times, starting at the calibration point all the way until heavy load injections. You can check the multiplier map e.g.every 2 [ms] starting at the calibration point. If necessary, add a point at the multiplier map to set it more precisely.
Once the manual setting is complete, both maps-petrol and LPG-should match.

3.6. Multiplier map calibration-3D map

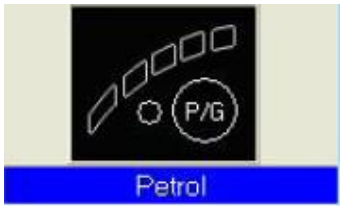
Having performed auto calibration and having set the multiplier map while driving, additional calibration of the multiplier depending on the engine revolutions can be performed using the 3D map (see 2.13). If there are any differences in injection times for a given range of the petrol injection time and the engine revolutions after switching frompetrol to LPG, such differences must be calibrated by means of enriching/weakening using the 3D map. The rule is the same as in the case of setting the multiplier, i.e. if the injection time value is bigger after switching frompetrol to LPG, it means that the mixture is too lean at a given point within the map (the petrol computer lengthens the petrol injection time). Thus, the mixture must be enriched for this point using the 3D map. In a reverse situation, i.e. when the petrol injection time is shorter after switching from petrol to LPG, the mixture must be weakened.

3.7. LPGtemperature correction

If the petrol injection time changes when the LPG temperature is changed in the LPG mode, the LPG temperature calibration must be corrected. The correction may be made by means of the “LPG temperature calibration map” (see 2.16). **However, it must be remembered that this operation may be performed if the auto calibration and the multiplier setting while driving have been carried out correctly.** In order to make the correction in a proper way, the car must be started with a cold engine.Then, beginning with the temperature of switching to LPG, the petrol injection time must be checked and after switching to LPG the **petrol injection time** should be compared. If the petrol injection time value is bigger after switching to LPG, the positive correction must be made for this LPG temperature value (the LPG temperature calibration map must be brought up). If the petrol injection time value is lower after switching to LPG, the calibration map for a given LPG temperature value must be brought down. The calibration map must be set in such a way as to ensure that the **petrol injection time** remains the same after switching frompetrol to LPG. In order to set the LPG temperature calibration map correctly, the procedure described above must be repeated for the full range of LPG temperature values in 5 [°C] steps.

4. LED switchboard operation and acoustic signals (User Manual)

4.1. LED switchboard



The LED switchboard consists of:

- LED line indicating LPG level
- the LED indicating type of fuel
- button

LED line-shows current LPG level in the tank. 4 green LEDs indicate a full tank; a red LED indicates “reserve”.

The LED-shows current operating status:

- off . the engine runs on petrol
- slow blinking (once per second) . awaiting engine temperature reading
- normal blinking (twice per second) . the controller is in the auto mode (waiting for required rpmbefore switching to LPG)
- fast blinking (4 times per second) . controller error (no LPG in the tank)
- on . the engine runs on LPG

Push button -for switching fromone fuel type to another

The controller “remembers” the last fuel type setting before switching the ignition switch off.

In order to start the engine on LPG (e.g. when the petrol pump is damaged), press in and hold the button on the LED switchboard while turning the ignition on. The LED should come on. When the engine revolutions are detected, the controller turns the solenoid valves on and the engine starts on LPG.

In this mode, it is not possible to turn back to petrol. Turn the ignition off to turn this special mode off.

4.2. Acoustic signals

The controller generates the following acoustic signals:

- Three acoustic signals . when switching from LPG to petrol because of lowLPG level in the tank
- Three short acoustic signals followed by a long one . when a controller error occurs
- When switching the ignition off . two short signals followed by a long one indicate a scheduled service visit. Visit a service station to have your systemchecked.

5. Specification

Power supply voltage	12[V] 20% +30%
Maximumpower supply current value for 8 cylinder controller,	25 [A]
LPG injectors 1[Ω]	
Current input in the standby mode	< 10 [mA]
Operating temperature	-40 -110 [°C]
Protection class	IP54

6. Limited warranty / exclusions

The warranty shall not cover the following:

1. Damage resulting frominstalling the unit inconsistently with applicable installation diagram.
   - in particular, damage resulting from connecting signal wires to other connections than those indicated in the installation manual.
2. Damage resulting frominstalling the unit in locations inconsistent with the installation manual as well as locations in which the unit may be affected by water, high temperature or car battery vapour.
3. Systems modified or repaired by unauthorised parties.
4. Mechanical damage resulting fromthe customer's fault, in particular:
   - connections damage,
   - connections damage resulting from application of chemical cleaning substances,
   - casing damage,
   - PCB damage,
5. Systems damaged electrically due to connecting communication interfaces other than those recommended in the installation manual.